GR 98 P 2651 P **BOX AF**

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By: Marlene Wells Date: Oct 15, 2003

19/Response
10-21-03
A.Wells

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applic. No. : 09/816,927 Confirmation No. 6167

Applicant : Heinrich Brunner et al.

Filed : March 23, 2001

Title : Semiconductor Component Having Field-Shaping Regions

Examiner : Kiesha L. Rose

Docket No. : GR 98 P 2651 P

Group Art Unit : 2822

Customer No. : 24131

R E S P O N S E under 37 C.F.R. § 1.116

Hon. Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

S i r :

Responsive to the final Office action dated July 18, 2003, the following remarks are made:

Reconsideration and allowance of claims 1-20 are solicited.

Claims 1-20 remain in the application.

In the second paragraph on page 2 of the above-identified Office action, claims 1-3, 5-7, 10-14, 16-17, and 20 have been rejected as being obvious over *Nishizawa et al.* (US 5,175,598) in view of *Stengl* (US 5,113,237) under 35 U.S.C. § 103.

In the *Response to Arguments* on page 5 of the Office action, the Examiner stated that:

> Applicant's arguments filed 12 May 2003 have been fully considered but they are not persuasive. Applicant's arguments referring to the Nishizawa et al. disclosing a channel region is erroneous as is disclosed in the prior art (Column 2, lines 51-67) that disclose that the switching device contains channel regions formed in the semiconductor body and surrounding semiconductor regions. In addition they are current channels are provide electrical connection to the semiconductor body. Therefore the rejection stands.

The rejections and the Examiner's comments have been considered. However, as will be explained below, it is believed that the claims were patentable over the cited art in their original form and the claims have, therefore, not been amended to overcome the references.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 12 (similarly claims 1 and 11) calls for, inter alia:

> each one of said semiconductor regions ***being interrupted*** at at least one location ***by channels*** formed by said semiconductor body, said ***channels electrically connecting parts of said semiconductor body*** separated by said semiconductor regions

The Examiner stated in the third paragraph on page 3 of the Office action that "Nishizawa discloses all of the limitations except for the semiconductor body having a doping concentration greater than 5 x 10^{13} charge carrier cm^{-3}. Whereas Stengl discloses … a semiconductor body (1) with a doping concentration of 10^{18} cm^{-3} to properly form conductive regions."

In col. 2, lines 50-66, *Nishizawa et al.* state:

> The semiconductor body is formed with a heavily doped n.sup.+ type semiconductor substrate 5 and a lightly doped n.sup.- type semiconductor layer 4, and ***this layer 4 contains therein a plurality of separate current channel regions***. In the vicinity of the upper surface of the n.sup.- type semiconductor layer 4, there is disposed a heavily doped p.sup.+ type semiconductor region 3 which has a grid-like shape as shown in FIG. 1 so as to surround a plurality of individual portions of the n.sup.- type semiconductor layer 4. ***The grid-like shape p.sup.+ type region 3*** is a common non-driving gate which is associated with all the separate current channels. In those portions of the n.sup.- type semiconductor layer 4 which are surrounded by the non-driving gate region 3 are provided heavily doped p.sup.+ type semiconductor regions 2 which serve as the driving gates for the respective current channels.

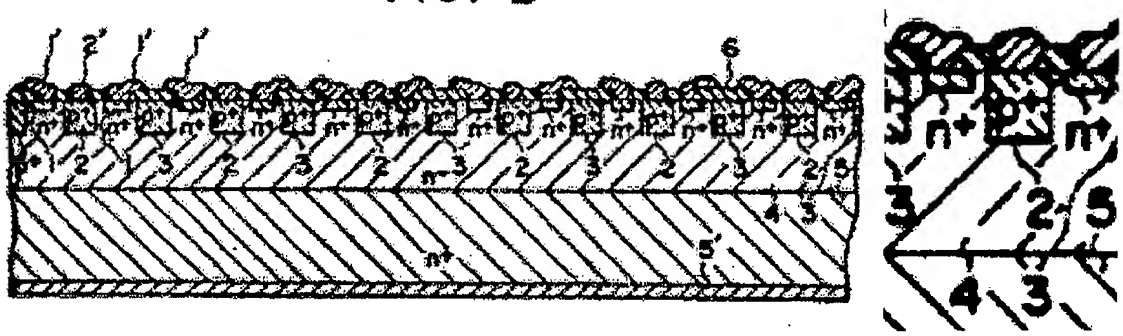
(Emphasis added.)

The reference in *Nishizawa et al.* to "current channel regions" is in regard to "layer 4". In contrast, the "region 3" has a "grid-like shape".

Nishizawa et al. do not disclose or suggest a semiconductor region of a second conductivity type ***surrounding*** the semiconductor zone ***except*** for a channel formed of a semiconductor of a first conductivity type which also electrically connects parts of the semiconductor body otherwise being electrically separated from each other by the semiconductor regions. *Nishizawa et al.* state in col. 2, lines 55-59, "there is disposed a … p+ type semiconductor region 3 … so as to surround a plurality of individual portions of the n- type semiconductor layer 4." No "channel" connecting parts of "semiconductor region 3" with "n- type semiconductor layer 4a" is either disclosed or suggested in *Nishizawa et al.*.

The lack of "channels" can be clearly seen in Fig. 2 of *Nishizawa et al.*, reproduced below together with an enlarged section thereof.

FIG. 2



The inventive concept of the invention of the instant application is to avoid large reverse currents despite high applied voltages by using a semiconductor component having a semiconductor layer with a doping concentration greater than 5 x 10^{13} charge carriers cm^{-3} in combination with a semiconductor region of a second conductivity type ***surrounding*** the semiconductor zone ***except*** for a channel formed of a semiconductor of a first conductivity type. The applied references neither suggest nor contain the relevant teaching that would suggest such a semiconductor component. Therefore, the invention as recited in claims 1, 11, and 12 of the instant application is also believed not to be obvious over the cited references.

It is accordingly believed to be clear that *Nishizawa et al.* in view of *Stengl* do not suggest the features of claims 1, 11, and 12. Claims 1, 11, and 12 are, therefore, believed to be patentable over the art and since claims 2-10 and 13-20 are

ultimately dependent on either of claims 1 and 12, they are believed to be patentable as well.

In the last paragraph on page 3 of the Office action, claims 4 and 15 have been rejected as being obvious over *Nishizawa et al.* and *Stengl* in view of *Siergiej et al.* (US 5,945,701) under 35 U.S.C. § 103.

In the second paragraph on page 4 of the Office action, claims 8-9 and 18-19 have been rejected as being obvious over *Nishizawa et al.* and *Stengl* in view of *Notley* (US 5,324,971) under 35 U.S.C. § 103.

Considering the deficiencies of the primary reference *Nishizawa et al.*, it is believed not to be necessary at this stage to address in more detail the secondary reference *Stengl* or the secondary references *Siergiej et al. and Notley* applied in the above-noted rejection of certain dependent claims, and whether or not there is sufficient suggestion or motivation with a reasonable expectation of success for modifying or combining the references as required by MPEP § 2143.

In view of the foregoing, reconsideration and allowance of claims 1-20 are solicited.

If an extension of time is required, petition for extension is herewith made.

Please charge any fees that might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner and Greenberg, P.A., No. 12-1099.

Respectfully submitted,

Markus Nolff (Reg. No. 37,006)

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Lerner and Greenberg, P.A.
Post Office Box 2480
Hollywood, FL 33022-2480
Tel: (954) 925-1100
Fax: (954) 925-1101